

# Homework 10

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Due April 13.

1. Consider again the  $n$ -fold integral which we found as an approximation to a Wiener integral; discuss how to evaluate it by Markov chain Monte-Carlo.
2. Consider the one dimensional Ising model; group the variables in groups of two, and pick as resolved variables the spins at the odd locations. Let  $H_j$  be the Hamiltonians  $H_j = \sum_i s_i s_{i+j}$ . Calculate an approximation to  $\hat{H}$  as follows: Assume that  $\hat{H}$  can be written as  $\hat{H} = a_1 H + a_2 H_2$ , where  $H_j = \sum_i s_i s_{i+j}$ . Find the coefficients  $a_1, a_2$  as follows: project  $(d/ds_1)H$  on the subspace spanned by  $(d/ds_1)H_2, (d/ds_1)H_4$  (note the 4!!!), then renumber the spins so that all the sites are occupied. Explain why the subspace projected on is the way suggested above. Write a code, with temperature  $T = 1$ , evaluating the needed coefficients by MC. .